Title	***Transverse Feedback System***			
Project Requestor	Michael Borland			
Date	March 21, 2008			
Group Leader(s)	Borland, Decker, Harkay			
Machine or Sector Manager	Louis Emery			
Category	Accelerator Hardware and ID Upgrades			
Content ID*	APS_XXXXXX	Rev.	ICMS_Revision	ICMS Document Date

*This row is filled in automatically on check in to ICMS. See Note [1]

Description:

Start Year (FY)	**2009**	**Duration (Yr)**	**3**

Objectives:

To build a fully-integrated transverse feedback system for the storage ring.

Benefit:

To allow operating at lower chromaticity, which will improve lifetime and perhaps injection efficiency. This will result in less radiation damage and easier operation. A full bunch-by-bunch feedback system in principle can also provide damping to many beam instabilities.

Risks of Project: See Note [2]

Low.

Consequences of Not Doing Project: See Note [3]

Benefits not realized.

Cost/Benefit Analysis: See Note [4]

Cost needs to be estimated.

Description:

This is part of a multi-proposal initiative aimed at reducing radiation damage and making other operational improvements to the SR. (See Section 1 of OAG-TN-2008-008 for a full

description and explanation of the linkage among the parts).

Beam lifetime and injection efficiency can be improved by running at lower chromaticity. However, we are forced to run at high chromaticity in order to stabilize the beam at high charge per bunch. The P0 feedback system, currently in development, will allow us to determine whether feedback will allow reducing the chromaticity and hence improving both lifetime and injection efficiency; experience from other labs suggests it will. Assuming a successful outcome, we propose development of a full bunch-by-bunch transverse feedback system based on FPGA technology. New FPGA technology will be explored to achieve the required more than 200 Mhz sampling and processing rate. Design of new, longer feedback kickers may be required, and space will need to be found in a high-beta location. Impedances of the kickers will need to be evaluated to ensure there are no surprises.

Funding Details

Cost: ($K)
Use FY08 dollars.

Year	AIP	Contingency
1	100000	
2	150000	
3	77500	
4		
5		
6		
7		
8		
9		
Total	327500	

Contingency may be in dollars or percent. Enter figure for total project contingency.

Effort: (FTE)
The effort portion need not be filled out in detail by March 28

Year	Mechanical Engineer	Electrical Engineer	Physicist	Software Engineer	Tech	Designer	Post Doc	Total
1	0.2	0.2	0.1	0.2	0.3	0.1		1.1
2	0.3	0.2	0.1	0.1	0.3	0.4		1.4
3		0.2	0.1	0.1	0.25			0.65
4								0
5								0
6								0
7								0
8								0
9								0

[1] **Notes:**

ICMS. Check in first revision to ICMS as a *New Check In*. Subsequent revisions should be checked in as revisions to that document i.e. C*heck Out* the previous version and C*heck In* the new version. Be sure to complete the *Document Date* field on the check in screen.

[2] **Risk Assessment.** Advise of the potential impact to the facility or operations that may result as a consequence of performing the proposed activity. Example: If the proposed project is undertaken then other systems impacted by the work include ... (If no assessment is appropriate then enter NA.)

[3] **Consequence Assessment.** Advise of the potential consequences to the facility or to operations if the proposal is not executed. Example: If the proposed project is not undertaken then ____ may happen to the facility. (If no assessment is appropriate then enter NA.)

[4] **Cost Benefit Analysis.** Describe cost efficiencies or value of the risk mitigated by the expenditure.

Example: Failure to complete this maintenance project will result in increased total costs to the APS for emergency repairs and this investment of ___ will also result in improved reliability of ____. (If no assessment is appropriate then enter NA.)